

WHAT IS CLAIMED IS:

1. An optical compensatory sheet producing method of producing an optical compensatory sheet having a liquid crystal layer, comprising steps of:

5 subjecting a first layer of support material to a rubbing process, so as to form an orientation layer, said first layer including resin;

removing dust from said orientation layer by use of liquid to which said orientation layer is insoluble; and

10 after said removing step, coating said orientation layer with coating liquid including liquid crystalline compound, thereby said liquid crystal layer being formed.

2. An optical compensatory sheet producing method as defined in claim 1, wherein said removing step includes 15 polishing said orientation layer with said liquid in a direction equal to a direction of said rubbing process.

3. An optical compensatory sheet producing method as defined in claim 2, further comprising steps of:

before said rubbing process, coating said support 20 material with first coating liquid including said resin, to obtain said first layer;

after said coating step of said coating liquid to said orientation layer, heating said liquid crystalline compound at phase forming temperature, to form said liquid crystal 25 layer; and

curing said liquid crystal layer to obtain said optical compensatory sheet.

4. An optical compensatory sheet producing apparatus for producing an optical compensatory sheet having a liquid 30 crystal layer, comprising:

a rubbing unit, supplied with support material having a

first layer including resin, for subjecting said first layer to a rubbing process, so as to form an orientation layer;

a dust remover for removing dust from said orientation layer by use of liquid to which said orientation layer is
5 insoluble; and

a liquid crystal layer coater, disposed downstream from said dust remover, for coating said orientation layer with coating liquid including liquid crystalline compound, thereby said liquid crystal layer being formed.

10 5. An optical compensatory sheet producing apparatus as defined in claim 4, further comprising a liquid bath for containing said liquid;

wherein said dust remover includes a cleaning roller, dipped in said liquid at least partially, for contacting said
15 orientation layer, to polish said orientation layer with said liquid in said direction of said rubbing process.

6. An optical compensatory sheet producing apparatus as defined in claim 5, further comprising:

a resin layer coater, disposed upstream from said
20 rubbing unit, for coating said support material with first coating liquid including said resin, to obtain said first layer;

a thermal treating unit, disposed downstream from said liquid crystal layer coater, for heating said liquid
25 crystalline compound at phase forming temperature, to form said liquid crystal layer; and

a curing unit for curing said liquid crystal layer to obtain said optical compensatory sheet.

7. An optical compensatory sheet producing apparatus as
30 defined in claim 6, wherein said liquid is perfluorocarbon having 6-12 carbon atoms.

8. An optical compensatory sheet producing apparatus as defined in claim 6, wherein said liquid is straight chain siloxane having 2-4 silicon atoms.

9. An optical compensatory sheet producing apparatus as defined in claim 6, further comprising a dry-type dust remover, disposed upstream from said dust remover, for removing dust from said orientation layer by blow of compressed air.

10. A thermal treating method for a coating layer formed by coating traveling web with coating liquid, comprising steps of:

blowing said coating layer with hot air through an air blow opening; and

sucking said hot air from said coating layer in a position upstream or downstream from said air blow opening according to a traveling direction of said web so as to, while said hot air flows on said coating layer, keep a flow speed of said hot air equal to or lower than 1 m/sec with reference to a web width direction crosswise to said traveling direction.

11. A thermal treating apparatus for a coating layer formed by coating traveling web with coating liquid, comprising:

at least one hot air supply unit for blowing said coating layer with hot air; and

at least one exhaust unit, disposed upstream or downstream from said hot air supply unit in a traveling direction of said web, for sucking said hot air from said coating layer.

30 12. A thermal treating apparatus as defined in claim 11, further comprising a controller for adjusting a first

flow speed at which said hot air is supplied by said hot air supply unit, and a second flow speed at which said hot air is sucked by said exhaust unit.

13. A thermal treating apparatus as defined in claim 5 12, wherein said hot air supply unit includes:

a hot air generator for generating said hot air;
an air blow opening disposed to face said coating layer;

10 a supply fan or blower, controlled by said controller, for sending said hot air from said hot air generator through said air blow opening;

said exhaust unit includes:
an exhaust opening disposed to face said coating layer;

15 an exhaust fan or blower, controlled by said controller, for sending said hot air from said exhaust opening.

14. A thermal treating apparatus as defined in claim 13, wherein said controller controls said supply fan or blower and said exhaust fan or blower, to keep a flow speed 20 of said hot air equal to or lower than 1 m/sec with reference to a web width direction crosswise to said traveling direction.

15. A thermal treating apparatus as defined in claim 14, wherein as viewed in said web width direction, said air 25 blow opening has 1.05-2 times as great a size as a width of said web.

16. A thermal treating apparatus as defined in claim 15, further comprising a flow speed sensor for detecting said flow speed of said hot air on said coating layer;

30 wherein said controller controls said supply fan or blower and said exhaust fan or blower according to said flow

speed.

17. A thermal treating apparatus as defined in claim 16, wherein said air blow opening includes plural air blow nozzles arranged in said traveling direction.

5 18. A thermal treating apparatus as defined in claim 17, wherein said air blow nozzles are arranged in a matrix manner.

10 19. A thermal treating apparatus as defined in claim 17, wherein said air blow nozzles are slit-shaped and extend crosswise to said traveling direction.

20. A thermal treating apparatus as defined in claim 19, wherein said air blow nozzles are disposed in a zigzag manner.

15 21. A thermal treating apparatus as defined in claim 17, wherein said hot air supply unit is disposed 3-300 mm distant from said coating layer.

22. A thermal treating apparatus as defined in claim 21, wherein said at least one hot air supply unit comprises plural hot air supply units;

20 said at least one exhaust unit comprises plural exhaust units disposed alternately with said plural hot air supply units in said traveling direction.

21. A thermal treating apparatus as defined in claim 21, further comprising a far infrared heater for applying 25 heat energy to said coating layer in addition to said hot air from said hot air supply unit.

23. A thermal treating apparatus as defined in claim 23, wherein said coating liquid includes liquid crystalline compound, and said coating layer is a liquid crystal layer of 30 an optical compensatory sheet.

25. A dust removing method for web, comprising steps

of:

blowing a first surface of said web with compressed air,
to remove dust from said web;

after said air blowing step, nipping said web between a
5 cleaning member and a pinch member;

polishing said first surface with said cleaning member
and liquid, to remove dust from said web; and

after said polishing step, rinsing said first surface
with liquid, to remove dust from said web.

10 26. A dust removing apparatus for web, comprising:

a first dust remover for removing dust from said web by
blowing a first surface of said web with compressed air;

15 a rinsing unit, disposed downstream from said first dust
remover with reference to said web being traveled, for
removing dust from said web by rinsing said first surface
with liquid;

20 a second dust remover, disposed between said first dust
remover and said rinsing unit, including a cleaning member
and a pinch member for contacting respectively said first
surface and a second surface of said web, to nip said web,
wherein said cleaning member polishes said first surface with
liquid, to remove dust from said web.

27. A dust removing apparatus as defined in claim 26,
wherein said cleaning member and said pinch member are a
25 cleaning roller and a rotatable pinch roller;

further comprising a liquid bath for containing said
liquid in which said cleaning roller is dipped at least
partially.

30 28. A dust removing apparatus as defined in claim 27,
wherein each of said cleaning roller and said pinch roller
includes:

a roller body; and
a resilient roll fitted about said roller body.

29. A dust removing apparatus as defined in claim 28,
further comprising:

5 a feeder for traveling said web at one traveling
speed;

 a motor for rotating said cleaning roller at one
peripheral speed different from said traveling speed.

30. A dust removing apparatus as defined in claim 29,
10 wherein said first dust remover includes:

 at least one air blow opening for blowing said first
surface with said compressed air to separate said dust from
said web;

15 at least one exhaust opening for sucking said compressed
air to eject said dust.

31. A dust removing apparatus as defined in claim 30,
wherein said at least one air blow opening and said at least
one exhaust opening are slit-shaped and extend in a web width
direction crosswise to a traveling direction of said web.

20 32. A dust removing apparatus as defined in claim 30,
wherein said first dust remover includes an ultrasonic
vibrator for ultrasonically vibrating said compressed air to
be supplied from said air blow opening.

25 33. A dust removing apparatus as defined in claim 32,
wherein said second dust remover further includes an
ultrasonic vibrator, disposed in said liquid bath, for
applying ultrasonic waves to said cleaning roller dipped in
said liquid, to remove dust from said cleaning roller.

30 34. A dust removing apparatus as defined in claim 32,
further comprising a drier, disposed downstream from said
rinsing unit, for blowing said web with air to dry said

liquid.

35. A dust removing apparatus as defined in claim 34, wherein said drier includes:

at least one air blow opening for blowing said first surface with said air to separate said liquid from said web;

at least one exhaust opening for sucking said air to eject said liquid.

36. A dust removing apparatus as defined in claim 35, 10 wherein said at least one air blow opening and said at least one exhaust opening are slit-shaped and extend in a web width direction crosswise to a traveling direction of said web.

37. A dust removing apparatus as defined in claim 35, wherein said drier includes an ultrasonic oscillator for 15 ultrasonically vibrating said air to be supplied from said air blow opening.

38. A dust removing apparatus as defined in claim 26, further comprising at least one pair of rotatable edge rollers for supporting first and second edges of said first 20 or second surface, to guide said web in a non-contact state from a central portion of said web.

39. A dust removing apparatus as defined in claim 26, further comprising:

a hovering roller, opposed to said first or second 25 surface, for guiding said web;

plural holes or slits formed in a peripheral wall of said hovering roll;

a fan or blower for blowing said web through said plural holes or slits with compressed air, to keep said web in a 30 non-contact state from said web.

40. A sheet producing apparatus for producing a sheet

from web, comprising:

a coater for coating said web being traveled with coating liquid to form a coating layer;

5 at least one hot air supply unit for blowing said coating layer with hot air;

at least one exhaust unit, disposed upstream or downstream from said hot air supply unit in a traveling direction of said web, for sucking said hot air from said coating layer; and

10 a controller for adjusting a first flow speed at which said hot air is supplied by said hot air supply unit, and a second flow speed at which said hot air is sucked by said exhaust unit.

41. A sheet producing apparatus for producing a sheet
15 from web, comprising:

a first dust remover for removing dust from said web by blowing a first surface of said web with compressed air;

20 a rinsing unit, disposed downstream from said first dust remover with reference to said web being traveled, for removing dust from said web by rinsing said first surface with liquid;

25 a second dust remover, disposed between said first dust remover and said rinsing unit, including a cleaning member and a pinch member for contacting respectively said first surface and a second surface of said web, to nip said web, wherein said cleaning member polishes said first surface with liquid, to remove dust from said web.